

Laboratory Studies of Shrimp Tolerances to Salinity and Temperature

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Abstract

Two types of study—24-hour survival and 30-day growth—have been used to test the combined effects of salinity and temperature upon acclimated grooved postlarval penaeids (brown or pink shrimp). The 24-hour survival tests, conducted over ranges of 45 to 98F and 2 to 40 parts per thousand (ppt), indicated that postlarvae had wide tolerance limits to both factors. One hundred per cent of the postlarvae survived all combinations of 68 to 90F temperatures with salinities of 5 to 37 ppt. However, 100% mortality occurred at salinities of 5 ppt or below when temperatures were above 95F or below 60F.

Survival in growth studies using four temperature levels (52, 65, 77, and 90F) combined with five salinities (2, 5, 15, 25, and 35 ppt) was quite similar to that seen in the 24-hour work except for somewhat greater mortality at 90F. Postlarvae held at 2 ppt died within 20 days at all temperatures below 90F. The greatest observed growth of 1.0 to 1.1 mm per day was attained by postlarvae held at 90F. Postlarvae at 77F grew approximately 0.8 mm per day and those at 65F only 0.3 mm per day. Essentially no growth was observed in postlarvae held at 52F. Measurement of food intake indicated that rapid growth required 2 to 3 grams of food for each gram increase in weight.

Survival data indicate that these grooved postlarval penaeids were able to withstand wide fluctuations of both salinity and temperature. Growth also occurred within a wide salinity range, but was restricted to a much narrower temperature zone than that at which good survival was observed. Although growth rate was apparently affected more by temperature than salinity, higher salinities may be more favorable than lower ones as the temperature limits are approached. Both the tolerances and the food requirements would seem to be of considerable importance to the animals in the estuarine phase of its life history.